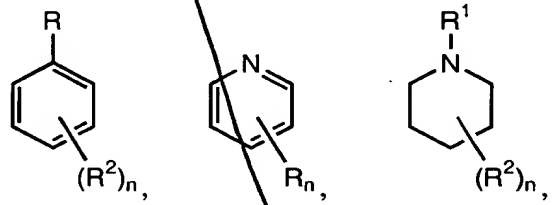
CLAIMS

1. A method comprising treating a human patient susceptible to or exhibiting symptoms of conditions characterized by aggregate-forming species associated with a disease, by administering to the patient a therapeutically effective amount of a composition having a high net polarization and comprising a structure selected from the group consisting of:



a five membered ring including at least one heteroatom, at least two rings bridged by at least one atom, at least two rings bonded directly to each other, a ring containing at least one carbonyl, and an alkyl chain;

wherein R and R^2 can be the same or different and each is a substituent of an organic group or chlorine, n is an integer greater than 0 and no more than 6 and each R can be the same or different and each R^2 can be the same or different; R^1 is a substituent of an organic group or hydrogen; any ring structure optionally including at least one carbon-carbon double bond; any ring structure optionally including at least one heteroatom selected from the group consisting of a carbonyl, nitrogen, oxygen and sulfur; each substituent being arranged so as to create polarity in the structure;

the patient being otherwise free of indication for treatment with the composition.

2. The method of claim 1, wherein the composition comprises an aromatic ring.

3. The method of claim 1, wherein the patient is susceptible to but does not exhibit symptoms of the conditions.

4. The method of claim 1, wherein the patient exhibits symptoms of the conditions.

5. The method of claim 1, wherein the disease is associated with fibril formation or aberrant protein aggregation.

6. The method of claim 5, wherein the disease is a neurodegenerative disease.

7. The method of claim 6, wherein the disease is selected from the group consisting of Familial British Dimentia, Parkinson's Disease, Alzheimer's Disease, Finnish-type Familial Amyloidoses, Huntington's Disease, AD, Frontotemporal Dementia, Senile Systemic Amyloidosis, Familial Amyloid Polyneuropathy, Transmissible Spongiform Encephalopathie, Gertsmann-Strausseler-Scheinker Syndrome, Fatal Familial Insomnia, Huntington's Chorea, Kuru, Familial amyloid polyneuropathy, Creutzfeldt Jakob, Scrapie, and Bovine Spongiform Encephalopathy.

8. The method of claim 1, wherein the composition is capable of crossing the blood/brain barrier.

9. The method of claim 5, wherein the disease is a non-neurodegenerative disease.

10. The method of claim 9, wherein the disease is selected from the group consisting of multiple myeloma, Waldenstroms Macroglobulinemia, blockage of affected blood vessels caused by precipitates of cryoglobulins, Disseminated intravascular coagulation, Glanzmann's thrombasthenia, Abnormal fibronectin aggregation, Sickle cell anemia, stroke and Type II Diabetes.

11. The method of claim 1, wherein the composition is selected from the group consisting of DNA bases, RNA bases, DNA base analogs, RNA base analogs, DNA base derivatives and RNA base derivatives.

12. The method of claim 11, wherein the composition is an anti-metabolite.

13. The method of claim 12, wherein the composition is a chemotherapy agent.

14. A method as in claim 1, wherein the structure is not:

R1-----R2

wherein R1 and R2 can be the same or different and each is able to bind a neurodegenerative disease aggregate-forming species or aggregate, and (------) is a tether having length and flexibility sufficient such that R1 and R2 each are able to bind a different neurodegenerative disease aggregate forming species or aggregate.

15. A method as in claim 1, wherein the patient is free of indication for treatment for central nervous system neuronal damage, as caused by aggregate formation.

16. A method as in claim 15, comprising administering the composition to a patient free of symptoms of dementia.

17. A method as in claim 1, comprising administering to the patient the composition demonstrates the ability to inhibit conversion of peptides related to a pathogenic state of neurodegenerative disease from a soluble, monomeric state to an insoluble, beta-sheet, oligomeric state characteristic of abnormal protein deposits found in the human brain in connection with neurodegenerative disease.

18. The method of claim 1, wherein the composition demonstrates the ability to inhibit conversion of peptides related to a pathogenic state of neurodegenerative disease from a α-helix to an insoluble, beta-sheet, oligomeric state characteristic of abnormal protein deposits found in the human brain in connection with neurodegenerative disease.

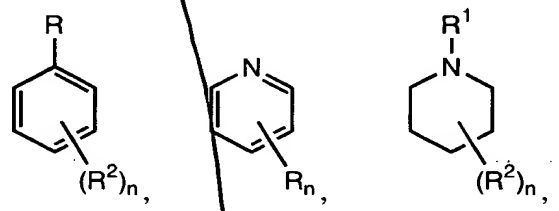
19. The method of claim 1, wherein the composition demonstrates the ability to inhibit conversion of peptides related to a pathogenic state of neurodegenerative disease from a soluble, monomeric state to an early intermediate aggregate.

20. The method of claim 1, comprising treating the patient with at least two different compositions effective against at least two different stages of the condition.

21. The method of claim 1, further comprising treating the patient with a dose of normal DNA or RNA bases.

22. A method comprising:

promoting the prevention or treatment of a disease caused by aggregate formation via administration of a composition having a high net polarization and comprising a structure selected from the group consisting of:



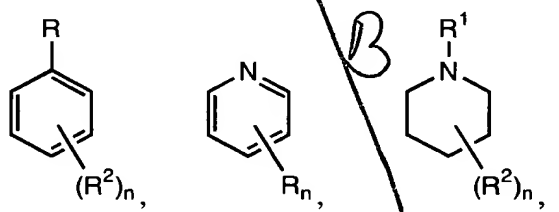
a five membered ring including at least one heteroatom, at least two rings bridged by at least one atom, at least two rings bonded directly to each other, a ring containing at least one carbonyl, and an alkyl chain;

wherein R and R^2 can be the same or different and each is a substituent of an organic group or chlorine, n is an integer greater than 0 and no more than 6 and each R can be the same or different and each R^2 can be the same or different; R^1 is a substituent of an organic group or hydrogen; any ring structure optionally including at least one carbon-carbon double bond; any ring structure optionally including at least one heteroatom selected from the group consisting of a carbonyl, nitrogen, oxygen and sulfur; each substituent being arranged so as to create polarity in the structure.

23. The method of claim 22, wherein the disease is characterized by aggregate formation.

24. A method of treatment comprising:

treating the patient with a composition having a high net polarization and comprising a structure selected from the group consisting of:



a five membered ring including at least one heteroatom, at least two rings bridged by at least one atom, at least two rings bonded directly to each other, a ring containing at least one carbonyl, and an alkyl chain;

wherein R and R^2 can be the same or different and each is a substituent of an organic group or chlorine, n is an integer greater than 0 and no more than 6 and each R can be the same or different and each R^2 can be the same or different; R^1 is a substituent of an organic group or hydrogen; any ring structure optionally including at least one carbon-carbon double bond; any ring structure optionally including at least one heteroatom selected from the group consisting of a carbonyl, nitrogen, oxygen and sulfur; each substituent being arranged so as to create polarity in the structure;

drawing a sample from the patient; and

monitoring the sample over at least two different points in time.

25. The method of claim 24, wherein the step of monitoring involves subjecting the sample to an assay.

26. The method of claim 25, wherein the assay comprises adding a plurality of binding species capable of binding to an aggregate.

27. The method of claim 25, wherein the step of monitoring further comprises detecting results of the assay.

28. The method of claim 27, wherein the step of detecting comprises detecting aggregate formation.

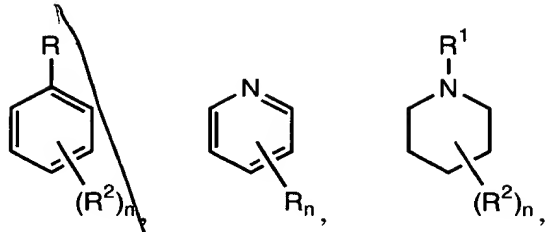
29. The method of claim 28, wherein the step of detecting occurs visually.

30. The method of claim 28, wherein the step of detecting occurs via spectroscopy.

31. A method of treatment, comprising:

withdrawing a sample from the patient;

subjecting the sample to a composition having a high net polarization and comprising a structure selected from the group consisting of:



a five membered ring including at least one heteroatom, at least two rings bridged by at least one atom, at least two rings bonded directly to each other, a ring containing at least one carbonyl, and an alkyl chain;

wherein R and R^2 can be the same or different and each is a substituent of an organic group or chlorine, n is an integer greater than 0 and no more than 6 and each R can be the same or different and each R^2 can be the same or different; R^1 is a substituent of an organic group or hydrogen; any ring structure optionally including at least one carbon-carbon double bond; any ring structure optionally including at least one heteroatom selected from the group consisting of a carbonyl, nitrogen, oxygen and sulfur; each substituent being arranged so as to create polarity in the structure;

determining whether to treat the patient with the composition.

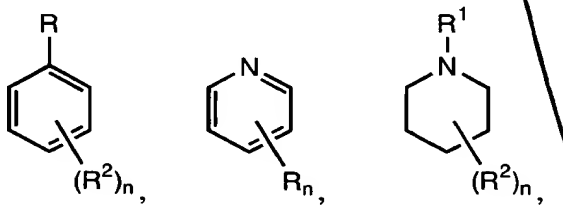
32. The method of claim 31, wherein the step of subjecting comprises adding the composition to the sample.

33. The method of claim 32, wherein the step of subjecting further comprises adding a plurality of binding species capable of binding to an aggregate.

34. The method of claim 31, wherein the step of determining comprises determining whether the composition is capable of inhibiting aggregate formation.

35. A kit comprising:

a composition having a high net polarization and comprising a structure selected from the group consisting of:



a five membered ring including at least heteroatom, at least two rings bridged by at least one atom, at least two rings bonded directly

to each other, a ring containing at least one carbonyl, and an alkyl chain;

wherein R and R^2 can be the same or different and each is a substituent of an organic group or chlorine, n is an integer greater than 0 and no more than 6 and each R can be the same or different and each R^2 can be the same or different; R^1 is a substituent of an organic group or hydrogen; any ring structure optionally including at least one carbon-carbon double bond; any ring structure optionally including at least one heteroatom selected from the group consisting of a carbonyl, nitrogen, oxygen and sulfur; each substituent being arranged so as to create polarity in the structure; and

instructions for use of the composition for treatment of a disease caused by aggregate formation.

36. The kit of claim 35, wherein the disease is neurodegenerative disease.

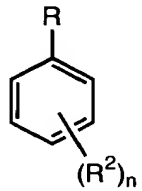
37. The kit of claim 35, wherein the structure includes a hydrophobic portion and a hydrophilic portion.

38. The kit of claim 35, wherein the drug comprises a DNA base or base derivative.

39. The kit of claim 38, wherein the base derivative includes a nitrogen atom bonded to a sugar or a sugar derivative.

40. The kit of claim 39, wherein the sugar derivative includes a chain of at least two phosphates.

41. The kit of claim 35, wherein the drug comprises the aromatic structure:

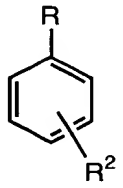


and R and R^2 is selected from the group consisting of a primary amine, a secondary amine, a hydroxyl, an amide, an alkylamide, a carboxyl, a carboxylic acid, a carboxylate, an ester, a sulfonate, a C_1-C_6 alkoxide optionally interrupted or terminated by a chlorine atom or a nitrogen atom and a C_1-C_6 alkyl optionally interrupted or terminated by a chlorine atom or a

nitrogen atom.

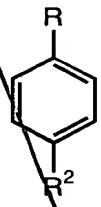
42. The kit of claim 41, wherein n is zero and the drug is 1-phenylbiguanide.

43. The kit of claim 41, wherein the drug comprises the structure:



44. The kit of claim 43, wherein the drug is selected from the group consisting of phenylephrine hydrochloride and arecoline hydrobromide.

45. The kit of claim 43, wherein the drug comprises the structure:



wherein R and R^2 are different.

46. The kit of claim 45, wherein R has an electronegativity greater than that of hydrogen, and R^2 has an electronegativity less than that of hydrogen.

47. The kit of claim 45, wherein the drug is selected from the group consisting of S(-)-atenolol, R(-)-atenolol, tetracaine hydrochloride, octopamine hydrochloride and procainamide hydrochloride.

48. The kit of claim 41, wherein n is at least 2 and the structure comprises at least a tri-substituted aryl ring.

49. The kit of claim 48, wherein the drug is selected from the group consisting of (±)-sulpiride, (±)-vanillyl mandelic acid, (-)-α-methyl norepinephrine, normetanephrine

hydrochloride, MHPZ piperazine and erbstatin analog.

50. The kit of claim 48, wherein R^2 comprises a C_1-C_6 alkoxide optionally interrupted by nitrogen.

51. The kit of claim 50, wherein R comprises a C_1-C_6 alkoxide optionally interrupted by nitrogen.

52. The kit of claim 51, wherein the drug is gallamine triethiodide.

53. The kit of claim 41, wherein the aromatic structure is a first ring, R and at least one of R^2 is positioned on an adjacent carbon atom, the adjacent R^2 and R comprises a second ring fused to the first ring such that the drug comprises a fused ring structure.

54. The kit of claim 53, wherein the drug is selected from the group consisting of Metazone, ICI 11,551 hydrochloride and indatraline hydrochloride.

55. The kit of claim 53, wherein the fused ring structure comprises a tri-fused ring.

56. The kit of claim 55, wherein the drug is selected from the group consisting of (-)-physostigmine, telenzepine dihydrochloride, Loxapine succinate, Thioridazine hydrochloride, (+/-) octoclothepin maleate, luphenazine dihydrochloride and CGS-12066A dimaleate.

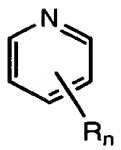
57. The kit of claim 55, wherein the fused ring structure comprises a tetra-fused ring.

58. The kit of claim 57, wherein the drug is selected from the group consisting of podophyllotoxin and spironolactone.

59. The kit of claim 53, wherein the second ring structure includes at least one nitrogen atom.

60. The kit of claim 59, wherein the drug is pindolol.

61. The kit of claim 35, wherein the structure is:



and R is selected from the group consisting of a primary amine, a secondary amine, a hydroxyl, a C_1-C_6 alkyl, a C_1-C_6 alkoxide, a carboxyl, a carboxylate, a carboxylic acid and an amide.

62. The kit of claim 61, wherein the drug is 4-aminopyridine.

63. The kit of claim 61, wherein two R substituents form a ring such that the drug comprises a fused ring structure.

64. The kit of claim 35, wherein the drug comprises the structure:

wherein the ring optionally includes a second nitrogen and optionally includes at least one carbon-carbon double bond.

65. The kit of claim 64, wherein the ring includes at least one carbonyl.

66. The kit of claim 64, wherein the drug is chlomezanone.

67. The kit of claim 64, wherein two R^2 groups form a ring such that the drug comprises a fused ring structure.

68. The kit of claim 67, wherein the drug is debrisoquin sulfate.

69. The kit of claim 64, wherein the ring includes two nitrogen atoms.

70. The kit of claim 69, wherein the drug is selected from the group consisting of uracil, 5-trifluoromethyl-5,6-dihydro, primidone and urapidil-5-methyl.

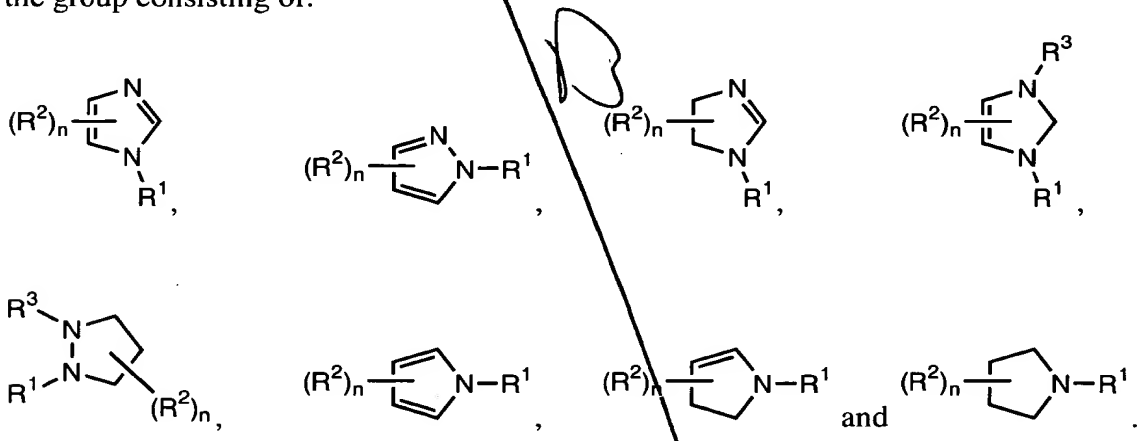
71. The kit of claim 69, wherein the drug comprises a fused ring structure.

72. The kit of claim 71, wherein the drug is selected from the group consisting of 8-cyclopentyl-1,3-dimethylxanthine, 1-allyl-3,7-dimethyl-8-p-sulphophenyl-xanthine, Tracazolate and alpha, beta-methylene adenosine 5' triphosphate dilithium.

73. The kit of claim 69, wherein the drug comprises a DNA base or DNA base derivative.

74. The kit of claim 35, wherein the drug comprises a five-membered ring containing at least one heteroatom selected from the group consisting of oxygen, nitrogen, sulfur and silicon.

75. The kit of claim 74, wherein the heteroatom is nitrogen, the ring being selected from the group consisting of:



wherein R^2 is selected from the group consisting of an organic group and chlorine, each R^2 can be the same or different, n is an integer no more than 4; R^1 and R^3 can be the same or different and each is selected from the group consisting of an organic group and hydrogen; any two R^2 groups on adjacent carbon atoms being capable of forming a ring such that the drug comprises a fused ring structure.

76. The kit of claim 75, wherein R^1 and R^3 is selected from the group consisting of hydrogen, a sugar, a sugar derivative, a C_1-C_6 alkyl optionally interrupted or terminated by a nitrogen, and an aryl.

77. The kit of claim 76, wherein the drug is selected from the group consisting of histamine-R(-)-α-methyl-dihydrochloride, histamine-1-methyl-hydrochloride and cimetidine.

78. The kit of claim 76, wherein the five-membered ring includes a carbonyl.

79. The kit of claim 78, wherein the drug is selected from the group consisting of phenylbutazone and oxotremorine methiodide.

80. The kit of claim 75, wherein the five-membered ring is fused to a six-membered ring.

81. The kit of claim 80, wherein the six-membered ring is aromatic.

82. The kit of claim 81, wherein the drug is 1,3-dihydro-1-[2-hydroxy-5-(trifluoromethyl)phenyl]-5- (trifluoromethyl)-2H-benzimidazol-2-one.

83. The kit of claim 81, wherein the six-membered ring contains two nitrogen atoms.

84. The kit of claim 83, wherein the drug is N6-cyclopentyl 9-methyladenine.

85. The kit of claim 83, wherein R^1 comprises a sugar.

86. The kit of claim 85, wherein the drug is selected from the group consisting of S-(4-nitrobenzyl)-6-thioinosine, S-(4-nitrobenzyl)-6-thioguanosine, N6-methyladenosine, 2-phenylamineadenosine and alpha, beta-methylene adenosine 5' triphosphate dilithium.

87. The kit of claim 85, wherein the sugar is bonded to a chain of at least two phosphates.

88. The kit of claim 87, wherein the drug is p,p-di(adenosine-5')-tetraphosphate triammonium.

89. The kit of claim 83, wherein the fused rings comprise a structure selected from the group consisting of a purine and a purine derivative.

90. The kit of claim 74, wherein the heteroatom is oxygen.

91. The kit of claim 90, wherein the drug is (+)-cis-dioxolane

92. The kit of claim 35, wherein the drug comprises the structure comprising at least two rings bridged by at least one atom selected from the group consisting of carbon, nitrogen, silicon and sulfur.

93. The kit of claim 92, wherein the at least two rings are bridged by a bridging unit selected from the group consisting of a nitrogen atom, -N(R)-, -C(O)N(R)-, -N=N-, a C_1-C_6 alkyl, -C(S)N(R)-, -C(O)R- and $-S(O)_2N(R)-$, wherein R is selected from the group consisting of an aryl, an aryl radial, a C_1-C_6 alkyl optionally terminated by an amine, a C_1-C_6 alkyl radical and a hydrogen.

94. The kit of claim 93, wherein the drug is selected from the group consisting of diclofenac sodium, 4-[[4-formyl-5-hydroxy-6-methyl-3-[(phosphonooxy)methyl]-2-pyridinyl]azo]-1,3-benzenedisulfonic acid tetrasodium salt, phentolamine mesylate, 3,3',4,4'-tetramethoxy-N-methyl-diphenethylamine hydrochloride, thioperamide maleate and BRL 37344 sodium.

95. The kit of claim 92, wherein the drug is selected from the group consisting of p-fluorohexahydro-sila-difenidol hydrochloride, 4-DAMP methiodide, hexahydro-sila-difenidol hydrochloride.

96. The kit of claim 35, wherein the drug comprises a structure comprising a ring containing at least one carbonyl group and containing at least one nitrogen atom.

97. The kit of claim 96, wherein the ring contains two nitrogen atoms.

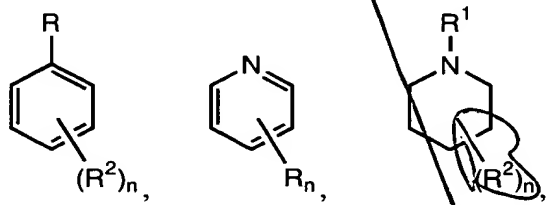
98. The kit of claim 97, wherein the drug comprises a DNA base or base derivative.

99. The kit of claim 35, wherein the drug comprises an alkyl chain and further comprising a unit selected from the group consisting of a carboxylate, a carboxylic acid, a phosphonate, a phosphoric acid, a primary amine and a secondary amine.

100. The kit of claim 99, wherein the drug is valproic acid sodium.

101. A kit comprising:

a composition having a high net polarization and comprising a structure selected from the group consisting of:



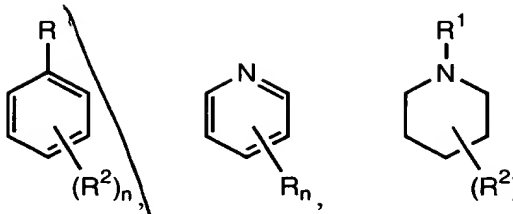
a five membered ring including at least one heteroatom, at least two rings bridged by at least one atom, at least two rings bonded directly to each other, a ring containing at least one carbonyl, and an alkyl chain;

wherein R and R^2 can be the same or different and each is a substituent of an organic group or chlorine, n is an integer greater than 0 and no more than 6 and each R can be the same or different and each R^2 can be the same or different; R^1 is a substituent of an organic group or hydrogen; any ring structure optionally including at least one carbon-carbon double bond; any ring structure optionally including at least one heteroatom selected from the group consisting of a carbonyl, nitrogen, oxygen and sulfur; each substituent being arranged so as to create polarity in the structure; and

instructions for use of the composition for treatment of disease.

102. A method comprising:

providing a composition having a high net polarization and comprising a structure selected from the group consisting of:



a five membered ring including at least one heteroatom, at least two rings bridged by at least one atom, at least two rings bonded directly to each other, a ring containing at least one carbonyl, and an alkyl chain;

wherein R and R^2 can be the same or different and each is a substituent of an organic group or chlorine, n is an integer greater than 0 and no more than 6 and each R can be the same or different and each R^2 can be the same or different; R^1 is a substituent of an organic group or hydrogen; any ring structure optionally including at least one carbon-carbon double bond; any ring structure optionally including at least one heteroatom selected from the group consisting of a carbonyl, nitrogen, oxygen and sulfur; each substituent being arranged so as to create polarity in the structure;

performing a combinatorial synthesis resulting in a plurality of compositions of the above structure; and

performing an assay involving a plurality of the compositions to determine their effectiveness in inhibiting neurodegenerative disease.

103. A kit, method, or composition as in any preceding claim, wherein the drug is selected from the group consisting of Atenolol, pindolol, histamine, methyl dihydrochloride, atenolol, 4-aminopyridine, physostigmine, and Tetracaine Hydrochloride.

104. A kit, method, or composition as in any preceding claim, wherein the drug is selected from the group consisting of sulpiride, uracil, 5-trifluoromethyl-5,6-dihydro, Atenolol, pindolol, BRL 37344 sodium, piperazine (2:1 ratio of 1-(4-hydroxy-3-methoxyphenyl)-1,2-ethanediol and diethyldiazene), cimetidine, methyl norepinephrine, oxotremorine methiodide, physostigmine, 4-aminopyridine, 1,3-dihydro-1-[2-hydroxy-5-(trifluoromethyl)phenyl]-5-(trifluoromethyl)-2H-benzimidazol-2-one), and erbstatin analog.

105. A method for treating a subject at risk of developing a disease or having a disease associated with fibril formation, comprising:

administering to the subject in need of such treatment an agent in an amount effective

to inhibit fibril formation,

wherein the subject is otherwise free of symptoms calling for treatment with the agent.

106. The method of claim 105, wherein the agent is sulpiride or a homolog, analog, or derivative of sulpiride.

107. The method of claim 105, wherein the agent is uracil, 5-trifluoromethyl-5,6-dihydro or a homolog, analog, or derivative of uracil, 5-trifluoromethyl-5,6-dihydro.

108. The method of claim 105, wherein the agent is BRL 37344 sodium or a homolog, analog, or derivative of BRL 37344 sodium.

109. The method of claim 105, wherein the agent is S(-)-atenolol or a homolog, analog, or derivative of S(-)-atenolol.

110. The method of claim 105, wherein the agent is pindolol or a homolog, analog, or derivative of pindolol.

111. The method of claim 105, wherein the agent is MHPZ piperazine or a homolog, analog, or derivative of MHPZ piperazine.

112. The method of claim 105, wherein the agent is R(-)+atenolol or a homolog, analog, or derivative of R(-)+atenolol.

113. The method of claim 105, wherein the agent is cimetidine or a homolog, analog, or derivative of cimetidine.

114. The method of claim 105, wherein the agent is (-)-α-methyl norepinephrine or a homolog, analog, or derivative of (-)-α-methyl norepinephrine.

115. The method of claim 105, wherein the agent is oxotremorine methiodide or a

homolog, analog, or derivative of oxotremorine methiodide.

116. The method of claim 105, wherein the agent is (-)-physostigmine or a homolog, analog, or derivative of (-)-physostigmine.

117. The method of claim 105, wherein the agent is 4-aminopyridine or a homolog, analog, or derivative of 4-aminopyridine.

118. The method of claim 105, wherein the agent is NS-1619 or a homolog, analog, or derivative of NS-1619.

119. The method of claim 105, wherein the agent is erbstatin analog or a homolog, analog, or derivative of erbstatin analog.

120. The method of claim 105, wherein the agent is R(-)-α-methyl, dihydrochloride or a homolog, analog, or derivative of histamine, R(-)-α-methyl, dihydrochloride.

121. The method of claim 105, wherein the agent is tetracaine hydrochloride or a homolog, analog, or derivative of tetracaine hydrochloride.

122. The method of claim 105, wherein the agent is spironolactone or a homolog, analog, or derivative of spironolactone.

123. The method of claim 105, wherein the agent is uracil, 5-trifluoromethyl-5,6-dihydro or a homolog, analog, or derivative of uracil, 5-trifluoromethyl-5,6-dihydro.